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CONTINUOUS ASSESSMENT TEST – II

24BSPH101-ENGINEERING PHYSICS - QUESTION BANK

MODULE III

	PART – A	K-Level	CO
1	Differential form of Gauss law in electrostatics a) $\nabla . D = \rho$ b) $\nabla . D = 0$ c) $\nabla . D = \mu_0 J$ d) $\nabla . D = -\frac{\partial B}{\partial t}$	K1	CO3
2	Differential form of Gauss law in magneto statics a) $\nabla . B = \rho$ b) $\nabla . B = 0$ c) $\nabla . B = \mu_0 J$ d) $\nabla . B = -\frac{\partial B}{\partial t}$	K1	CO3
3	The equation $\nabla \times E = -\frac{\partial B}{\partial t}$ is the differential form of a)Ampere's circuital law b) Faraday law c) Gauss law d)Coulomb's law	K1	CO3
4	The equation $\nabla \times B = J + \frac{\partial D}{\partial t}$ is the differential form of a)Ampere's circuital law b)Faraday law c) Gauss law d)Coulomb's law	K1	CO3
5	Which of the following is not Maxwell's equation's a) $\nabla . D = \rho$ b) $\nabla . B = -\mu_0 J$ c) $\nabla \times E = -\frac{\partial B}{\partial t}$ d) $\nabla \times B = J + \frac{\partial D}{\partial t}$	K1	CO3
6	Which of the following law do not form a Maxwell equation a)Planck's law b)Gauss's law c)Faraday's law d)Ampere's law	K1	CO3
7	A travelling wave is described by the equation y(x,t) = [0.05sin (8x – 4t)] m. The velocity of the wave is a)8 ms^{-1} b)4 ms^{-1} c) 0.5 ms^{-1} d)2 ms^{-1}	K2	CO3
8	The velocity of electromagnetic wave in vacuum is a) $C = \frac{1}{\sqrt{\varepsilon_0 \mu_0}}$ b) $C = \frac{2}{\sqrt{\varepsilon_0 \mu_0}}$ c) $C = \frac{3}{\sqrt{\varepsilon_0 \mu_0}}$ d) $C = \frac{\sqrt{\varepsilon_0 \mu_0}}{3}$	K1	CO3
9	What is meant by polarization of electromagnetic waves? a)The Polarization is the direction of electric current in an EM wave. b) The Polarization is the magnitude of the voltage in an EM wave. c) The Polarization is the direction of electric field in an EM wave. d) The Polarization is the inverse of the electric field in an EM wave.	K2	CO3

10	Polarization can occur in a)Transverse wave b)Longitudinal wave c)both 1 and 2 d)None of 1 and 2	K2	CO3
11	Which of the following properties of an electromagnetic wave is classified as linear, circular and elliptical a)Polarization b)Reflection c)Propagation d)Refraction	K1	CO3
12	The relation between electric and magnetic field vector in free space is a)$\frac{E}{H} = \sqrt{\frac{\varepsilon_0}{\mu_0}}$ b)$\frac{E}{H} = \sqrt{\frac{\mu_0}{\epsilon_0}}$ c)$\frac{H}{E} = \sqrt{\frac{\varepsilon_0}{\mu_0}}$ d)$\frac{H}{E} = \sqrt{\frac{\mu_0}{\delta_0}}$	K1	CO3
13	Which one is wrong regarding electromagnetic waves a) They does not require any medium for propagation b) The E and H are perpendicular to each other. c) Deflected by electric and magnetic fields. d) Not deflected by electric and magnetic fields.	K2	CO3
14	Which of the following devices is based on the phenomenon of electromagnetic induction? a)Galvanometer b)Ammeter c)Bulb d)Generator	K2	CO3
15	An electromagnetic wave can be produced when charge is a)moving with a constant velocity b)moving in a circular orbit c)falling in an electric field d)both b and c	K2	CO3
16	Electromagnetic waves consists of periodically oscillating electric and magnetic vectors a)in mutually perpendicular planes but vibrating with a phase difference of π. b) in mutually perpendicular planes but vibrating with a phase difference of π/2 c)in randomly oriented planes but vibrating in phase. d) in mutually perpendicular planes but vibrating but vibrating in phase.	K2	CO3
17	Maxwell in his famous equations of electromagnetism introduced the concept of a)ac current b)displacement current c)impedance d)reactance	K1	CO3
18	If E and B denote electric and magnetic fields respectively, which of the following is dimensionless a)$\sqrt{\varepsilon_0\mu_0}\frac{E}{B}$ b))$\mu_0\varepsilon_0\frac{E}{B}$ c) $\mu_0\varepsilon_0\left(\frac{B}{E}\right)^2$ d)$\frac{E}{\varepsilon_0}\frac{\mu_0}{B}$	K2	CO3
19	Electromagnetic charges are produced by a)Stationary charge b)Accelerated charge c)Charge in motion d)Electrically charged particles	K1	CO3

20	The energy (U) and momentum (P) of EM wave is related by a)$P = \frac{U}{2C}$ b) $P = \frac{2C}{U}$ c) $P = \frac{C}{U}$ d) $P = \frac{U}{C}$	K1	CO3
21	The radiation pressure for total absorption of EM radiation is a)$P = \frac{I}{C}$ b) $P = \frac{C}{I}$ c) $P = \frac{2C}{I}$ d) $P = \frac{2I}{C}$	K1	CO3
22	The radiation pressure for total reflection of EM radiation is a) $P = \frac{C}{I}$ b) $P = \frac{I}{C}$ c) $P = \frac{2C}{I}$ d) $P = \frac{2I}{C}$	K1	CO3

	PART – B	K-Level	CO
1	Write down the integral and differential form of Maxwell's equation from Gauss law in electrostatics.	K1	CO3
2	Write down the integral and differential form of Maxwell's equation from Gauss law in magneto statics.	K1	CO3
3	Write down the integral and differential form of Maxwell's equation from Faraday's law of electromagnetic induction.	K1	CO3
4	Write down the integral and differential form of Maxwell's equation from Ampere's law of electromagnetic induction.	K1	CO3
5	Write the significance of Maxwell's equation div.B = 0.	K2	CO3
6	Write the significance of Maxwell's equation div.D = ρ.	K2	CO3
7	Give the Maxwell's equation in integral form.	K1	CO3
8	Write the Maxwell's equations for free space.	K2	CO3
9	Write the Maxwell's equations for conducting medium.	K2	CO3
10	Write down the wave equation.	K1	CO3
11	What is polarization?	K1	CO3
12	Write the general electromagnetic wave equation in terms of magnetic field vector in free space.	K1	CO3
13	Write down the properties of electromagnetic waves.	K1	CO3
14	What is meant by radiation pressure?	K1	CO3
15	Explain about momentum and energy relation of electromagnetic wave.	K2	CO3

	PART – C	K-Level	CO
1	Derive Maxwell's equations in integral and differential form.	K2	CO3
2	Write Maxwell's equations and explain the characteristics of each equation.	K2	CO3

3	Using Maxwell's equation, derive the electromagnetic wave equation.	K2	CO3
4	Derive the Maxwell's equations for plane electromagnetic waves in vacuum.	K2	CO3
5	Describe the production of plane electromagnetic waves in detail.	K2	CO3
6	Briefly discuss the plane electromagnetic waves in vacuum and condition on the wave field.	K2	CO3
7	Discuss the production of electromagnetic waves and also mention the properties of electromagnetic waves.	K2	CO3
8	Discuss in detail the reflection and transmission of electromagnetic waves from a non-conducting medium.	K2	CO3
9	Discuss the path taken by electromagnetic waves when they move from a vacuum to a non-conducting substance.	K2	CO3
10	Derive Maxwell's equations from Faraday and Ampere's laws and explain its characteristics.	K2	CO3

MODULE IV

PART A

1	As the wavelength of radiation decreases the intensity of the black body radiation ---------- a) Increases b)Decreases c) First increases then decreases c)First decreases then increases	K2	CO4
2	Energy of photon is equal to a)Zero b) hυ c)Infinity d)None of the above	K1	
3	---------- are considered as oscillators in Planck's radiation law a)Photons b) Protons c) Electrons d) None of the above	K1	CO4
4	Planck's radiation law illustrates a)wave nature of light b)particle nature of light c)Both wave and particle nature d)None of the above	K1	CO4
5	Wien's displacement law holds good for a)Shorter Wavelength b)Longer wavelength c)Visible region d)Infrared region	K1	CO4
6	Rayleigh Jean's law holds good for a)Shorter wavelength b)Longer Wavelength c)X Ray region d)All types of wavelengths	K1	CO4
7	The Louis de-Broglie equation is given by	K2	CO4

	a) λ=h p b) λ= h/p c) λ= √hp d)λ=h+p		
8	The de-Broglie wavelength λ of a particle having a potential V is given by a)$\lambda = \frac{h}{\sqrt{2emV}}$ b) $\lambda = \frac{e}{\sqrt{2mhV}}$ c)$\lambda = \frac{V}{\sqrt{2emh}}$ d)$\lambda = \frac{m}{\sqrt{2ehV}}$	K1	CO4
9	If the kinetic energy of an electron becomes 9 times, then de-Broglie wavelength becomes a)9 times b)1/9 times c)3 times d)1/3 times	K2	CO4
10	If an electron and a proton have same de-Broglie wavelength then the kinetic energy of the electron is a)less than that of proton b)more than that of proton c)equal to that of proton d)zero	K2	CO4
11	When the kinetic energy of an electron is increased, the wavelength of the associated wave will a)wavelength does not depend on kinetic energy b)increases and then decreases c)decrease d)increase	K2	CO4
12	For a particle in a box, the finite potential region is a)x > a b)x < 0 c)0 < x < a d) $0 \geq x \geq a$	K1	CO4
13	Energy levels of particle in the box is a)discrete values with even spacing b)discrete values with uneven spacing c)continuous values d)Quasi continuous values	K1	CO4
14	Energy values of the particle in the box is given by a)$E_n = \frac{n^2h^2}{8ma^2}$ b)$E_n = \frac{8ma^2}{n^2h^2}$ c)$E_n = \frac{n^2h^2}{4ma^2}$ d)$E_n = \frac{n^2h^2}{6ma^2}$	K1	CO4
15	The normalized wave function in the particle in a box is given by a)$\psi_n = \sqrt{\frac{2}{a}}\ sin\frac{n\pi x}{a}$ b)$\psi_n = \sqrt{\frac{2}{a}}\ sin\frac{n\pi x}{2a}$ c)$\psi_n = \sqrt{\frac{2}{a}}\ sin\frac{n\pi x}{a}$ d)$\psi_n = \sqrt{\frac{2}{a}}\ sin\frac{n\pi x}{a}$	K1	CO4
16	What is the principle behind scanning tunneling microscope? a)Special relativity b)Kinetic molecular theory c)Quantum tunneling d)Mass-energy equivalence	K1	CO4
17	What is the separation kept between the tip and sample while raster scanning of the sample in STM? a)$4\dot{A} - 7\dot{A}$ b) $8\dot{A} - 15\dot{A}$ c) $30\dot{A} - 40\dot{A}$ d) $55\dot{A} - 70\dot{A}$	K1	CO4

	PART – B	K-Level	CO
1	Define Wien's displacement law.	K1	CO4
2	Define Rayleigh – Jeans law.	K1	CO4
3	Define Planck's radiation law.	K1	CO4
4	State the hypothesis of Planck theory.	K1	CO4
5	What is the physical significance of wave function?	K2	CO4
6	What is wave function? Give the significance of wave function.	K2	CO4
7	Write down the one dimensional Schrödinger time dependent equation and write the same for a free particle.	K1	CO4
8	Define Eigen value and Eigen function.	K1	CO4
9	Calculate the minimum energy of an electron can possess in an infinitely deep potential well of width 4 nm.	K2	CO4
10	What is degeneracy and non-degeneracy?	K1	CO4
11	What is the principle of scanning tunneling microscope?	K1	CO4
12	An electron at rest is accelerated through a potential of 5000 V. Calculate the de-Broglie wavelength of matter waves associated with it?	K2	CO4
13	State the properties of matter waves.	K1	CO4
14	What is quantum tunneling?	K1	CO4
15	Mention few applications of STM.	K2	CO4

	PART – C	K-Level	CO
1	Derive Planck's radiation law.		
2	Derive Planck's law for black body radiation and hence deduce Wien's displacement law and Rayleigh – Jean's law.	K2	CO4
3	Explain de- Broglie wave concept and hence derive different forms of de – Broglie wave equations. Mention its properties.	K2	CO4
4	Derive Schrodinger's time-independent and time dependent wave equations	K2	CO4
5	Apply Schrödinger equation to a particle in one dimensional box and calculate the Eigen value and Eigen function	K2	CO4
6	Solve Schrodinger's wave equation of a particle in a one dimensional box and find the normalization of wave function to study the behavior inside the potential well.	K2	CO4
7	Describe the principle, construction and working of Scanning Tunneling Microscope with neat sketch	K2	CO4

8	Derive Eigen value and Eigen function for an electron in a 2D dimensional box.	K2	CO4
9	Derive Eigen value and Eigen function for an electron in a 3D dimensional box.	K2	CO4
10	Derive an expression for energy levels of a particle enclosed in one dimensional potential box of width 'a' and infinite height.	K2	CO4

Course Outcomes

CO1	To understand the mechanical properties of materials. (K2)	
CO2	To express the knowledge of waves and to discuss about lasers and its applications. (K2)	
CO3	To understand the properties of electromagnetic waves and its propagation in different medium. (K2)	
CO4	To discuss the dual nature of matter and radiation and application of one dimensional Schrodinger's wave equations to a matter wave system. (K3)	
CO5	To understand the basics of crystal, its structure determination and different growth techniques. (K2)	
CO6	To discuss the heat transfer in different media and its applications. (K3)	

Distribution of COs (Percentage wise)						
CO No.	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**	**CO6**
%	**---**	**---**	**50**	**50**	**----**	**----**